Fisheries and Oceans Canada

Pêches et Océans Canada

# Selective (Salmon) Fisheries Program

## Final Report

Canada

102-04349/

## Introduction

*"Permanent change is necessary for the salmon fishery.... The 1998 salmon management plan will introduce a fundamental new direction for the management of the Pacific salmon fishery. Severe restrictions will be imposed on fishing activity in many areas, and selective, conservation-based fishing techniques are being introduced to conserve coho and other stocks at risk. Selective fishing is a cornerstone for conservation-based management and for a sustainable fishery for the future."*

*Minister of Fisheries and Oceans and Minister of Human Resources Development, 1998*

The Selective (Salmon) Fisheries Program Final Report provides an overview and summarizes the results of the Selective Fishing Program. It is designed with the many participants in the program in mind, including First Nations, harvesters, anglers and the many other contributing groups. The report is also a tribute to all those who contributed to the innovations and new fishing gear and methods developed over the four years of the program.

The Selective (Salmon) Fisheries Program was initiated in 1998 by Fisheries and Oceans Canada, Pacific Region, in response to the "coho crisis" and the introduction of restrictions on salmon fishing to protect Pacific coast coho stocks.

The Program was initially designed to last three years but was extended one additional year to allow more time to develop and test new selective fishing technology for implementation in fisheries. The department also recognized that full testing of potentially effective selective fishing gears and methods in realistic fishing circumstances was not possible during the initial three years of the program because of low salmon abundance.

From 1998 to 2002, the Selective Fisheries Program was a key element of the Pacific Fisheries Adjustment and Restructuring. Funding for the Selective Fisheries Program concluded March 31, 2002.

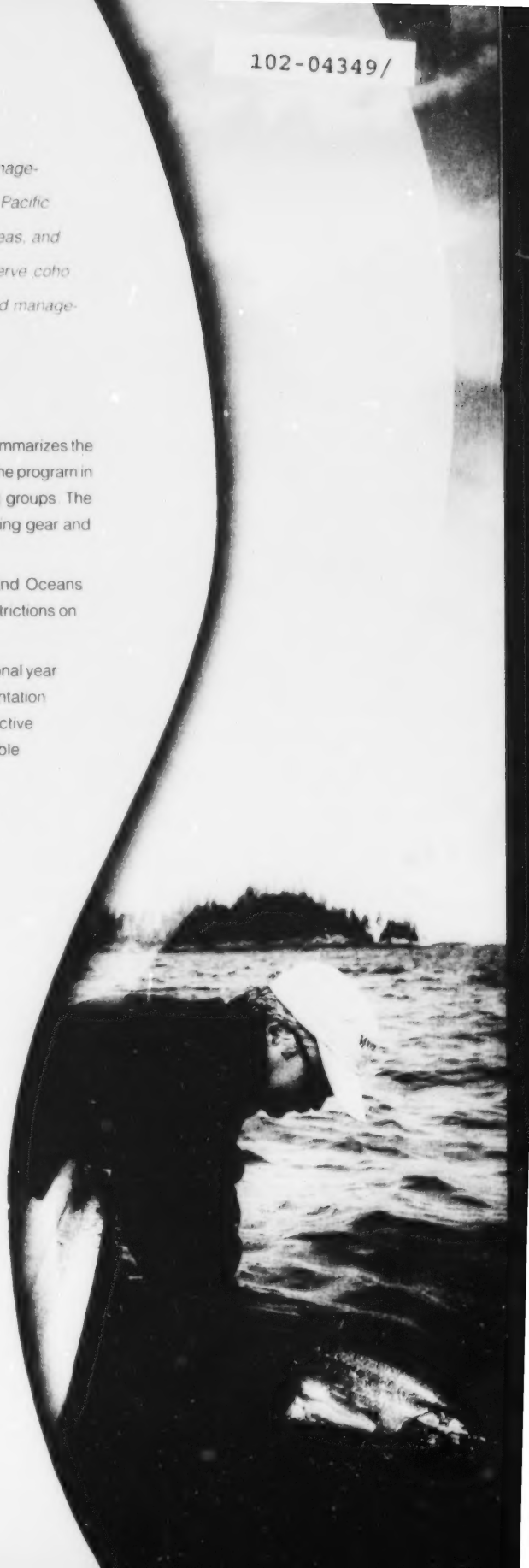
The Selective (Salmon) Fisheries Program Final Report is intended to summarize selective fishing activities, achievements and funding for selective salmon fisheries, and policy formation for all selective fisheries.

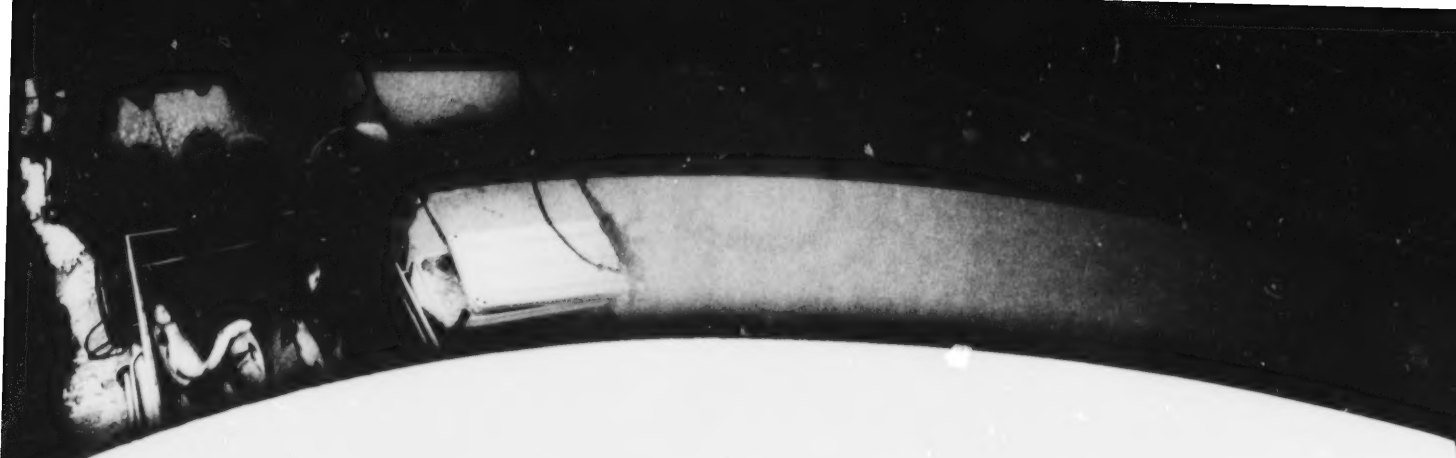
This report is structured in three parts.

Part One begins with a brief background on events leading up to the establishment of the program, followed by a description of the Selective Fisheries Program's design. Finally, there is a discussion of goals and objectives, in which key program outcomes and successes are then identified and matched with the program's original objectives.

Part Two describes the program's achievements and impacts. Part Two begins with a summary of the program dimensions and results of experimental pilot projects and research activities. This is followed by a list of partners and contributors.

Finally, in Part Three, key success factors are identified. This leads to a discussion of future responsibilities for the continued development of selective fishing.





## Part One

### Background

To address critical conservation concerns, the Minister of Fisheries and Oceans announced, on May 21, 1998, a fundamental change in direction for Pacific salmon fisheries. Two conservation objectives were announced.

1. Fisheries will be conducted to achieve a zero fishing mortality for critical upper Skeena and Thompson coho stocks.
2. Where upper Skeena and Thompson coho stocks are not prevalent, fisheries must be selective and demonstrate that the risk of coho by-catch mortality on other stocks will be minimal.

On June 19, 1998 the Minister of Fisheries and Oceans announced salmon fishing plans to achieve these stringent conservation objectives. Non-retention and non-possession of coho were introduced for all fisheries in 1998. No salmon fishing was allowed in significant areas of the BC coast. To avoid coho by-catch, various measures and selective fishing techniques were introduced.

- Mandatory brailing and sorting of salmon caught in seine fisheries and release of coho back into the water with the least possible harm.
- Use of barbless hooks by the troll and recreational fleets.
- Daylight only fisheries and quick sets by the gillnet sector.
- Mandatory use of revival boxes in all commercial fisheries (to ensure maximum survival of incidentally-caught coho).
- Extensive catch monitoring and log book programs to ensure compliance and collect data.

In October 1998, the Minister of Fisheries and Oceans presented a vision for the future through the release of *A New Direction for Canada's Pacific Salmon Fisheries*. A number of new policy initiatives have followed based on the principles initially promulgated in the *New Directions* paper including a salmon allocation framework, a selective fishing protocol and discussion papers on the management of wild salmon stocks and improved decision-making.[1]

Problems in Canada's fisheries were not unique. Globally, by-catch is a serious problem. Twenty-five percent of the global harvest of fish – about 27 million metric tonnes – is discarded annually. The United Nations' Food and Agriculture Organization (FAO) estimates that 70% of the world's marine fish stocks are heavily exploited, overexploited, depleted or slowly recovering; 13 of the globe's 17 major fisheries are in trouble, in part because of by-catch issues. In response to this problem, in 1995 the FAO promulgated its *Code of Conduct for Responsible Fisheries*. Canada played a lead role in the development of the FAO's Code of Conduct and in 1998, Canada's commercial fishing industry formulated its own Code.

International Plans of Action were adopted by the 23rd session of the FAO Committee on Fisheries, Rome, Italy, February 15-19, 1999:

- International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries
- International Plan of Action for the Conservation and Management of Sharks
- International Plan of Action for the Management of Fishing Capacity

[1] Pacific Region Integrated Fisheries Management Plan, Salmon, Southern BC, April 1, 2001 – March 31, 2002, pages 13-14.

A fourth International Plan of Action was adopted in 2001:

- International Plan of Action to prevent, deter and eliminate illegal, unreported and unregulated fishing

Canada has agreed to all four of the FAO's International Plans of Action.

The ability of licensed fishermen to harvest selectively, avoiding or releasing unharmed non-target fish, invertebrates, marine mammals and seabirds, is emerging as a fundamental element of Canada's commitment to the objectives of the *Oceans Act*, the requirements of the forthcoming *Species at Risk Act*, our international commitments to preserve biological diversity, and Canada's commitment to fish responsibly as a signatory to the *Code of Conduct for Responsible Fishing* developed by the FAO.

Fisheries and Oceans Canada, through its Strategic Plan and New Directions policies, has made it clear that the direction of fisheries management has made a permanent change toward conservation and sustainable use. The Pacific region's selective fishing policy states that, "fishing opportunities and resource allocations will be shaped by the ability of all harvesters ... to fish selectively."[2]

## Program Purpose

The Selective Fisheries Program was intended to increase the selectivity of harvesting practices and technologies to allow harvesting of surplus fish stocks while protecting stocks at risk.

The three program goals were:

1. Develop and evaluate more selective fishing techniques in commercial, First Nations and recreational salmon fisheries.
2. Facilitate implementation of selective fishing practices in commercial, First Nations and recreational salmon fisheries.
3. Communicate to participants in these fisheries harvesting methods and technologies that will lead to more selective fishing.

## Program Design

The Selective Fisheries Program was designed to provide the information necessary to make the transition from harvesting practices used in the past to new, more selective fishing regimes.

New selective fishing technologies were evaluated in experimental fisheries. Modified traditional fisheries were used to evaluate the effectiveness of full-scale commercial operations. Scientific design of experiments combined with intensive monitoring and evaluation were necessary to demonstrate that alternative approaches are more selective than historical practices. New knowledge was transferred to harvesters and anglers through training and communications.

The Selective Fisheries Program was designed in 1998 to include five components.

1. Experimental Pilots.
2. First Nations' Gear Purchase.
3. Research Projects.
4. Education, Training and Communication.
5. Compliance.

[2] A Policy for Selective Fishing in Canada's Pacific Fisheries, page 7.

| Sector | 1998 | 1999 | 2000 | 2001 | Total |
|---|---|---|---|---|---|
| Commercial | 10 | 24 | 23 | 16 | 73 |
| First Nations | 4 | 6 | 11 | 3 | 24 |
| Recreational | | 8 | 8 | 3 | 19 |
| Conservation | 1 | 1 | 2 | | 2 |
| Multi-Sectoral | | | 2 | | 2 |
| Total | 15 | 39 | 46 | 22 | 122 |

**Table 1: Selective Fishing Projects by Sector**

## Experimental Pilots

The objective of the experimental pilots component was to develop and assess new selective harvesting technologies and practices for First Nations, commercial and recreational fisheries. Pilot projects were controlled experiments of selective fishing techniques and gear carried out by harvesters and anglers. Fisheries and Oceans' scientists reviewed pilot projects to ensure that the aggregate mortality of coho did not exceed the Minister's conservation objectives.

During the past four years Fisheries and Oceans Canada has funded a total of 122 selective fishing experimental pilot projects. Selective fishing projects funded by Fisheries and Oceans Canada are shown by year and by fishing sector in Table 1.

Selective fishing projects are shown by type of project in Table 2.

All the rows of Table 2 except the last, Training & Education, refer to selective fishing projects and experiments investigating fishing gear and methods (eg. seine grids, multi-panel gillnet nets and alternative web, troll lures and hooks, and fish wheels and traps). In the early years, the focus of the Selective Fisheries Program was clearly gear development and testing. In the latter years, training and education received increasing attention.

## First Nations' Gear Purchase

The objective of the First Nations' gear purchase component was to assist First Nations to fish salmon for food, social and ceremonial purposes more selectively by providing alternative fishing gear to replace existing less selective gear.

Fisheries and Oceans Canada provided funding to 60 First Nations to purchase or construct selective fishing gear.

Funding totalling $816,000 was provided over the last three years of the Selective Fisheries Program to First Nations to purchase selective fishing gear ranging from beach seines and various kinds of gillnets (eg. tangle nets and Baltic Sea nets) to fish wheels, traps and weirs, and dip nets. The majority of First Nations' gear purchase funds were expended in the middle two years of the program (1999 and 2000) on beach seines, fish wheels and fish traps.

First Nations' gear purchase projects are summarized in Table 3.

## Research Projects

The objectives of the research component were to evaluate the effects of catch and release and the selectivity of traditional and

| Selective Gear | 1998 | 1999 | 2000 | 2001 | Total |
|---|---|---|---|---|---|
| Seine | | 4 | 3 | 4 | 11 |
| Gillnet | 2 | 12 | 4 | 9 | 27 |
| Troll | 1 | 4 | 3 | | 8 |
| All Commercial in Same Project | | | | 1 | 1 |
| Revival Tanks | | | 3 | 1 | 4 |
| Trap | 11 | 9 | 9 | | 29 |
| Fish Wheel | | 2 | 5 | | 7 |
| Beach Seine | 1 | | | | 1 |
| Recreational | | 8 | 5 | 1 | 14 |
| Total Gear Projects | 15 | 39 | 32 | 16 | 102 |
| Training & Education | | | 14 | 6 | 20 |
| Total Projects | 15 | 39 | 46 | 22 | 122 |

**Table 2:** Selective Fishing Projects by Type

| Gear | 1999 | 2000 | 2001 | Total |
|---|---|---|---|---|
| Beach Seine | 12 | 14 | | 26 |
| Trap | 4 | 6 | 3 | 13 |
| Fish Wheel | 3 | 8 | | 11 |
| Weir | 1 | | | 1 |
| Gillnet | 2 | 1 | | 3 |
| Dip Nets | 1 | | 1 | 2 |
| Counting Fence | 1 | | | 1 |
| Training & Information | | 2 | 1 | 3 |
| Total | 24 | 31 | 5 | 60 |

**Table 3:**
First Nations' Gear Purchase Projects by Gear Type

new technologies and approaches; to provide scientific support to develop new gear and fishing methods; and to evaluate the overall impact of selective fishing.

Over the four years of the Selective Fisheries Program, Fisheries and Oceans Canada provided a high level of scientific research, advice and support. Four research and evaluation tasks were identified: evaluation (does a selective fishing gear/method work?); scientific support for development of new gear; assessment of conservation measures; and specific research projects. A number of studies concentrated on estimating the numbers of critical coho stocks encountered in the fisheries and monitoring the numbers of return spawners. Other studies added to knowledge of stock distribution and timing through collection of DNA samples.

The most significant research investment was directed at determining the mortality of salmon after release from fishing gear. Examples of this work in 1998 included:

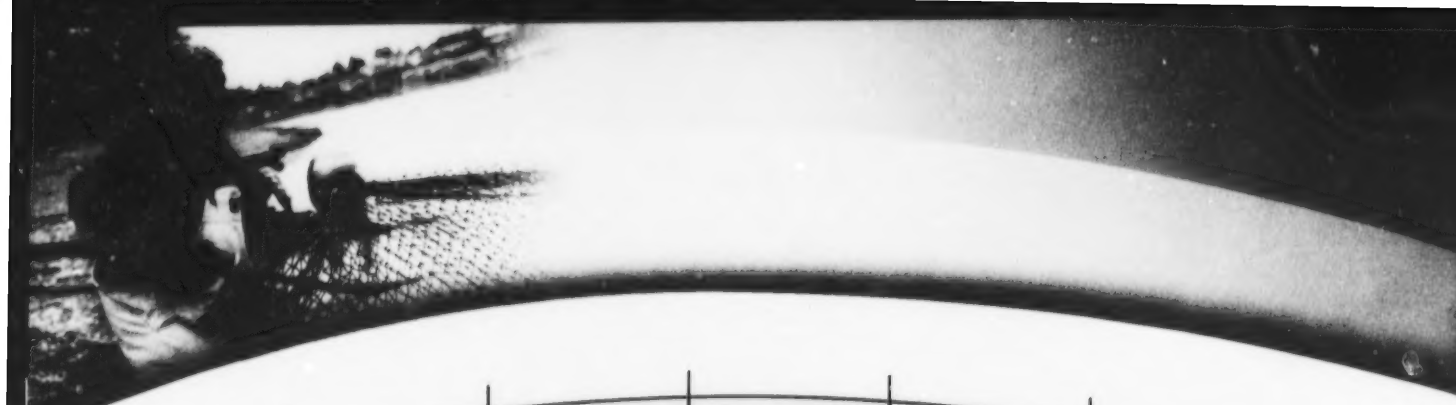
- A major post-release survival study in Barkley Sound.
- A blood/stress study by researchers at Simon Fraser University (SFU) to investigate (1) how stressed/fatigued/damaged are fish upon landing? (2) how well do landed fish recover in revival boxes/tanks and after 24 hours? (3) for questions (1) and (2) above, are there any differences within or between gear types?.
- A hook and release study (coho and chinook) to investigate hooking mortality in marine sport fisheries.

The department continued to conduct a variety of research projects in 1999.

- Recreational hooking mortality study in marine sport fisheries.
- Areas 1, 3 and 4 sport coho encounter program.
- South coast coho encounter and mortality study.
- South coast commercial catch monitoring (observers and log books).
- Coho stock status and escapements.

The research projects over the four years of the Selective Fisheries Program are summarized in Table 4.

Fisheries and Oceans Canada will review the results of all selective fishing experiments and prepare analyses and re-



| Year | Encounter Rates | Monitoring | Mortality | Stock ID | Other |
|---|---|---|---|---|---|
| 1998 | | | 3 | | |
| 1999 | 2 | 18 | 3 | 1 | |
| 2000 | | 2 | 8 | 4 | 2 |
| 2001 | 2 | | 7 | 5 | 6 |
| Totals | 4 | 20 | 21 | 10 | 8 |

**Table 4: Selective Fishing Research Projects**

commendations for consideration by Pacific Scientific Advice Review Committee (PSARC). Post-release mortality will continue to be studied: work currently underway in the recreational fishery will be continued by a departmental hooking mortality working group; and Science branch will be requested to develop advice regarding the feasibility and costs of, and approach to, defining long-term post-release mortality rates.

## Education, Training & Communication

The objectives of the education, training and communication component were to communicate findings of experimental pilot and research projects; to consult with stakeholders on project selection criteria and process; to support programs to train harvesters in fish identification and handling (to facilitate effective live releases), and in the use of new gear and methods; and to consult on selective fisheries policy.

Fisheries and Oceans Canada, in addition to the DFO-led workshops, sponsored numerous regional and local workshops to promote awareness of the move to selective fishing.

Several videos introducing selective fishing and reviewing early progress were produced by Fisheries and Oceans Canada. A video series consisting of seven modules housed on a single tape entitled "Salmon Sense: A Training Series for Responsible Fishing" was produced to assist in training and education of those involved in managing, harvesting and angling. These have been used at workshops and in open houses and specific training sessions. The Salmon Sense video is available in libraries throughout BC.

Numerous pamphlets, booklets, articles and other items on selective fishing have been produced and distributed.

### *First Nations*

First Nations have, for the most part, strongly embraced the use of selective fishing gear and methods.

A video entitled "Restoring Respect" produced by the British Columbia Aboriginal Fisheries Commission (BCAFC) highlights the move to more selective and responsible fisheries within First Nations communities.

The BCAFC is also facilitating production of a video on First Nation selective fishing in BC and Yukon (to be included in the Salmon Sense series). It was included in BCAFC workshops on selective fishing for First Nations throughout BC and the Yukon in early 2002.

### *Recreational*

Significant efforts to enhance selective recreational fishing began in the second year of the program.

Lead proponents of selective angling have updated two videos on selective fishing: one illustrates the best techniques for releasing salmon in tidal waters; the other outlines current information on survival rates for released salmon. These videos

were distributed to fish and wildlife clubs, angling associations, and cable television stations.

The recreational community is also developing educational materials to train anglers about the Code of Conduct for sport fishing in BC, salmon identification, and effective handling and release techniques.

### *Commercial*

In May 2001, selective fishing workshops were held in communities along the coast for gillnet and troll fishermen, covering topics such as: avoidance and catch-and-release techniques; new design of revival tanks; the role of science in developing selective fishing tools; and benefits to harvesters now and in the future.

The Area B seine fleet developed mandatory training sessions attended by each skipper and at least one crew member of seiners wishing to participate in the Area 20 demonstration fishery.

In June 2001, workshops were held in the lower mainland, Campbell River and Prince Rupert to review selective fishing with seine vessels and update regulations on catch reporting and fishery management in the Area 20 demonstration fishery.

Three videos were created that describe how to be selective on gillnet, troll and seine vessels. They were added to the Salmon Sense series and distributed to harvesters in 2001.

## Compliance

The objective of the compliance component was to ensure that all projects and selective fisheries met conservation objectives by increasing the number of on-board observers in the fisheries and augmenting the enforcement presence.

Salmon fishing plans were designed to minimize mortality of stocks of concern (ie, Thompson River and upper Skeena River coho), with harvesters in most fisheries required to release any coho encountered. It then became essential to estimate encounter frequency and subsequent post-release mortality of salmon.

Given the fundamental changes in the fishery due to the introduction of conservation-based and selective fishing, there was a need for enhanced enforcement.

Fishery monitoring observers were placed on vessels in most salmon fisheries. Formal training programs for observers were established through community colleges around the province.

Enforcement efforts were increased to ensure compliance with new restrictions in salmon fisheries.

Estimates of catch levels and stock escapements were funded for key indicator systems to measure the effects of new conservation standards implemented in salmon fisheries.

## Results

In this section, Selective Fisheries Program results are identified and matched with program goals and objectives.

The program met its primary purpose of increasing the selectivity of harvesting practices and technologies to allow harvesting of surplus fish stocks while protecting stocks at risk.

All salmon harvesters, and especially those fishing with nets, made significant progress in fishing selectively (ie, avoiding encounters with coho and other species/stocks of concern, and releasing those encountered alive and unharmed).

**Goal 1: Develop and evaluate more selective fishing techniques in commercial, First Nations and recreational salmon fisheries**

During the Selective Fisheries Program, Fisheries and Oceans Canada has funded 122 experimental studies in the Pacific Region conducted by First Nations, recreational anglers and commercial harvesters to improve selective fishing practices. Significant progress has been made and many lessons learned.

A wide range and number of selective fishing techniques and gear for the commercial fishery were developed and evaluated over the four years of the Selective Fishing Program. The First Nations fishery tested traditional methods such as fish wheels and weirs. Both First Nations and commercial harvesters tested in-river and ocean traps with limited success to date. Trap design and interactions with marine mammals continue to be significant hurdles to success. The recreational fishery tested selective lures and hook designs. While a variety of new fishing gears, methods and technologies have been developed over the past four years, the effectiveness of some show promise however many remain unproven or controversial (often due to the complex nature of scientifically testing gear in an ocean environment).

Through careful handling of the catch, purse seiners have demonstrated the ability, in highly controlled fishing situations, to reduce short-term post-release mortality of coho salmon from the standard 25 percent to 5 percent. This has been achieved by employing techniques such as brailing salmon from the water to a sorting area on deck, allowing species of concern to recuperate in on-board revival tanks before release, slowing the pace of the fishery and adopting innovative new brailer designs. These techniques have provided significant access to sockeye and pink salmon fisheries that otherwise would have remained closed for conservation reasons. Further work is underway examining in-water sorting and holding of seine-caught salmon which may result in even better post-release survival, and in addition, may lead to improved market quality of fish for harvesters.

Gillnet harvesters have, under highly controlled experimental conditions, demonstrated the ability to reduce, post-release mortality of coho from the standard 70 percent to as low as 5 percent. Work is underway to adapt experimental techniques – shortened nets, short set times, smaller mesh size, improved revival tank designs and careful handling of fish – to the open, competitive fisheries. It has also been demonstrated that gillnets in some areas tend to catch a lower proportion of coho in a given area than other salmon fishing gear, and can further reduce coho

*Pacific Fisheries Resource Conservation Council*
*Annual Report 2000-2001 (page 25)*

by-catch by fishing in daylight. Overall, gillnet harvesters have developed a "tool box" of fishing practices and net designs that can be applied as appropriate in different fisheries.

Early results indicate that salmon troll gear can selectively catch one species rather than another. For example, large plugs tend to catch chinook salmon rather than coho. Studies by trollers have increased post-release survival of by-catch by identifying improved release gear and methods. The nature of salmon trolling gear has, to some degree, limited the range of potential modifications. However, troll fleets have the potential to successfully avoid non-target species through time-and-area-specific fishing patterns. Satellite catch reporting technology is being applied to enhance this method of selective fishing for salmon trollers.

Post-release mortality experiments have been conducted in which salmon are held for 24 to 48 hours after capture and before being released. Despite this intensive and thorough work, questions about the long-term effects on salmon of catch-and-release have been raised by the Pacific Fisheries Resource Conservation Council, the Standing Committee for Fisheries and Oceans, and the Auditor-General for Canada. A significant knowledge gap remains. The undertakings required to resolve this issue are complex and expensive, but the department plans to continue to investigate solutions.

The issue is critical in part because post-release mortality rates are applied to determine the allowable encounter rate with salmon, which ultimately shapes the fishing plan where species of concern are present. Post-release mortality rates in which harvesters and managers can have confidence are required for specific fisheries and geographic areas. Catch-and-release studies in recreational salmon fisheries have demonstrated that post-release mortality of coho salmon can be significantly improved by the use of appropriate hook size and configuration, and methods of fishing. These results will lead to more sensitive and sustainable management regimes. For example, motor-mooching with herring bait can result in post-release mortality 2.5 times higher than the standard of 10 percent usually applied to other recreational fishing methods such as trolling lures.

### Goal 2: Facilitate implementation of selective fishing practices in commercial, First Nations and recreational salmon fisheries

The 2001-2002 Salmon Integrated Fishery Management Plans (IFMP) incorporated "the goal of developing selective fishing standards and implementation plans by January 2003."

The IFMP acknowledges "significant policy reform" in the Pacific region in the past six years and anticipates "continued change and evolution of new policy in coming years."[1]

The primary stock management objectives in the 2001-02 IFMP was "to minimize impacts on Thompson River coho in all fisheries (by maintaining) exploitation rates at a level similar to or less than recent years (1998-2000) which was in the range of 2% to 3% in Canadian fisheries." The IFMP also contained an objective to continue implementation of selective fishing measures in 2001 fisheries and to conduct scientific experimental projects to further improve selective fishing techniques for the future.

Management measures for recreational fisheries were carried over from 2000, including Special Management Zones (SMZs), barbless hooks in all salmon fisheries, and non-retention of coho (except in areas and times where stocks of concern are not impacted).

[1] Pacific Region Integrated Fisheries Management Plan, Salmon, Southern BC, April 1, 2001 - March 31, 2002, pages 13-14.

The 2001-02 IFMP detailed selective fishing measures that must be employed by salmon seine, gillnet and troll fishermen including: on-board observers; brailing of all seine sets (some minor exceptions); net mesh and depth restrictions, and set-length restrictions, for gillnetters; use of barbless hooks by trollers; sorting of fish caught; use of revival tanks of designated design(s); and participation in a mandatory log book program.

**Goal 3: Communicate to participants the salmon harvesting methods and technologies that will lead to more selective fishing**

The Selective Fisheries Program communicated selective harvesting methods and technologies to fishery participants. The continuation of the sharing of knowledge and skills between harvesters who are employing new selective fishing gear and techniques is anticipated to be a challenge.

Fisheries and Oceans Canada sponsored at least one selective fishing workshop in each year of the program. The first selective fishing technical workshop was held in Richmond, BC in the fall of 1998. Proponents of commercial and First Nations pilot projects made presentations to 230 attendees and initial research results were reported.

The department commissioned a *Selective Fisheries Review and Evaluation* that was published in January 1999. That document reviewed the background leading up to the implementation of selective fishing, reviewed historical and new selective fishing technologies, and provided a preliminary evaluation of selective fishing measures.

A Selective Fisheries Multi-Stakeholder workshop was held in Richmond in February 1999, at which pilot project and research results from 1998 were reviewed and the selective fishing program proposed for 1999 was presented. A proposal for selective fishing training was reviewed and working groups of First Nations, conservation, commercial seine, gillnet and troll, and recreational stakeholders considered priorities for experimental pilots and research in 1999, project selection criteria, and

*A major conservation achievement on the Skeena River this year was selective fishing for sockeye with measures that protected Upper Skeena coho. Commercial fishermen have been developing and testing different ways to harvest target species (Babine sockeye) selectively, without harming non-target coho, steelhead and minor sockeye stocks. While progress has been made in selective seine fisheries (since 1989), there were only modest results in selective gillnet fisheries. This year, however, gillnetters made changes in their gear and fishing operations that significantly reduced the mortality rate on coho. In return, fishermen were given the opportunity to catch more Babine sockeye. Without those changes, the sockeye would not have been available to catch because their migration timing is the same as for endangered coho.*

*Gillnetters were able to reduce their induced mortality of intercepted coho from about sixty percent to well below forty percent. The whole fleet co-operated and, as a result, was rewarded with increased catches. A total of 600,000 more sockeye were harvested because of these new arrangements, effectively doubling the gillnet catch on the Skeena to 1.2 million sockeye. This success was achieved through findings from research conducted by individual fishermen, under the auspices of the DFO selective fishing policy. These changes were a major conservation win for the coho. They illustrate how both sustainable management and harvesting are possible and can be profitable. They also give a clear indication of the strength of co-management with fishermen and managers working together to meet common goals. This success, moreover, helps to validate selective fishing techniques in the minds of fishermen.*

*Pacific Fisheries Resource Conservation Council*
*Annual Report 2000-2001 (pages 26-27)*

training and education needs. By this time, two selective fishing videos had been made and pamphlets had been produced on measuring fishing gear selectivity and guidelines for conducting selective fishing experiments for each of the commercial salmon gears.

The third multi-stakeholder selective fishing workshop was held in the autumn of 1999. The purpose of that workshop was to provide a forum for information exchange and review of the selective fishing program in Pacific region via presentation of several 1999 selective fishing experiments from all sectors (commercial, First Nations, recreational). A presentation was also made on the Canadian Code of Conduct for Responsible Fisheries Operations. Five working groups of workshop participants met on the last day of the three-day workshop to consider policy development; fisheries management; science and research; awareness, training and enforcement; and marketing and value-added possibilities.

In the winter of 2000-2001, community workshops were held in Prince Rupert, Port Hardy, Nanaimo, Port Alberni and Williams Lake. A summary workshop was held in Vancouver. These workshops continued to focus on selective fishing gear and techniques but also looked forward to the future of selective fishing without the funded Selective Fisheries Program.

One suggestion arising from the Vancouver selective fishing workshop in 2001 was for the creation of a selective fishing newsletter. Two newsletters were published on 2001 and one in 2002.

The selective fishing workshop proceedings and documents are available on the Fisheries and Oceans Canada selective fishing web site at http://www-comm.pac.dfo-mpo.gc.ca/english/selective/default.htm. Other workshops led by commercial harvesters and First Nations are mentioned later in this report.

*New, more selective and sustainable means of prosecuting fisheries were identified, such as the Area 20 (Strait of Juan de Fuca) demonstration fishery, as described in the 2001-02 IFMP. To access this fishery, the industry organized itself this year into an association and achieved consensus on a plan that met DFO's requirement to protect coho, chinook and steelhead. These requirements were to meet conservation objectives for stocks of concern, stay within allowable catch on target species, strictly control catch and reporting during the fishery, require fleet training and education, implement on-board monitoring, utilize selective fishing gear and techniques, and institute a post-release mortality study.*

*The plan developed had nearly unanimous support of the seine sector, including vessel owner organizations, the Union, the Native Brotherhood, processors and individual vessel owners. It was also remarkable in that it had the support of the other commercial gear sectors. A key mechanism was the formation of a single pool to share the catch equally among all participants. This eliminated fishing competition and allowed DFO to control individual sets. The other important mechanism was that the association developed the list of eligible vessels, providing unprecedented discipline. Eligible participants were required to pay for crew training and observers as well as post a $5,000 performance deposit.*

*The fishery took place on August 5-6, 2001. It started slowly, and developed as the DFO manager was able to ascertain selective compliance and low coho encounters. The first day was closed early, as sockeye catches were low, making even low coho encounters inappropriate. A lull in migration resulted in a small catch (46,000 sockeye, 11,000 pink). Participants were disappointed in the catch, but the value of designing a new fishery model was widely recognized.*

*Pacific Fisheries Resource Conservation Council. Annual Report 2000-2001 (pages 21-22)*

| Program Element | 1998 | 1999 | 2000 | 2001 | Total |
|---|---|---|---|---|---|
| Experimental Pilots | 898 | 2,100 | 750 | 500 | 4,248 |
| First Nations Gear Purchase | 1,002 | 500 | 500 | 0 | 2,002 |
| Research Projects | 2,527 | 1,433 | 1,400 | 850 | 6,210 |
| Communication, Education, Training | 200 | 250 | 550 | 400 | 1,400 |
| Compliance | 1,639 | 1,997 | 1,650 | 1,250 | 6,536 |
| Program Administration & Management | 104 | 250 | 500 | 250 | 1,104 |
| Totals | 6,370 | 6,530 | 5,350 | 3,250 | 21,500 |

**Table 5:** Selective Fisheries Program (Salmon) Funding ($.000s)

## PartTwo

In Part Two, expenditures, achievements and impacts of the Selective Fisheries Program are reviewed and summarized. Key partners in the Selective Fisheries Program are also identified in this section.

### Program Expenditures

The Selective Fisheries Program was funded by the federal Pacific Fisheries Adjustment and Restructuring Program, with partnered funding from a variety of sources such as:

- Total Allowable Catch (TAC) fish sales (commercial sector).
- Fisheries Renewal BC.
- Ecotrust
- Industry Canada's Industrial Research Assistance Program (IRAP).

In the four years over which the program has operated (1998 to 2001) a total of $21.5 million has been expended (See Table 5).

Based on a policy that up to 5% of the coast-wide TAC could be used for selective fishing, the department allowed fish that were caught in selective fishing experiments to be sold to pay for all, or a portion of, project costs.

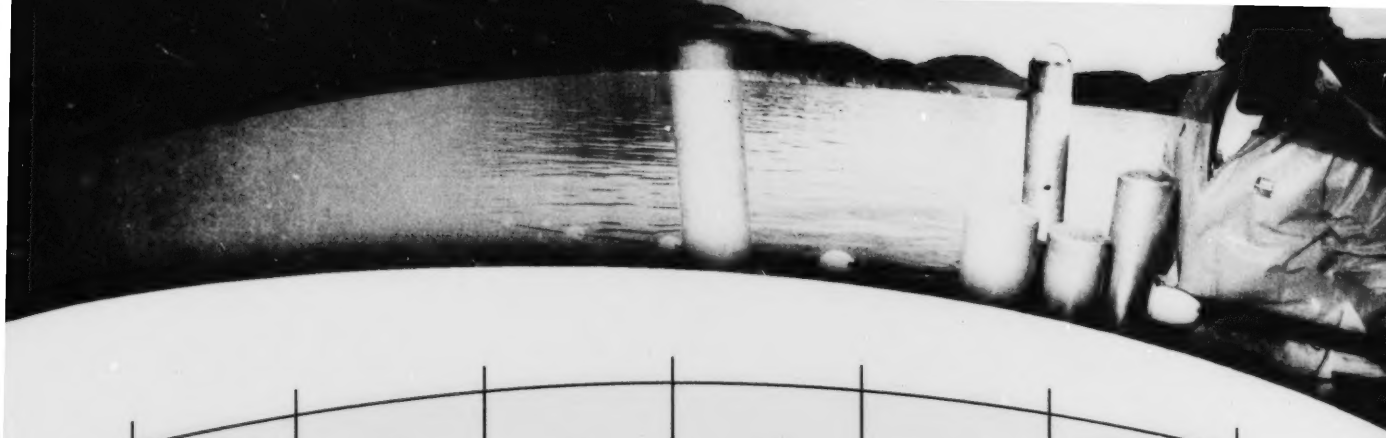
For a detailed list of projects and expenditures, visit Fisheries and Oceans Canada's selective fishing website at http://www-comm.pac.dfo-mpo.gc.ca/english/selective/default.htm.

### Pilot Projects

Pilot projects were the cornerstone of the Selective Fisheries Program. They were used to demonstrate the efficacy of selective fishing, to provide training to others interested in learning how to fish selectively and responsibly and, in a broader sense, to educate the public that ultimately owns the fishery resource.

Pilot projects were undertaken across a number of sectors, and involved various gear types and methods of study.

Over the four years that the Selective Fisheries Program has been in operation, a number of pilot projects have been completed: 15



| Sector | 1998 | 1999 | 2000 | 2001 | Total |
|---|---|---|---|---|---|
| Commercial | $430.3 | $1,252.2 | $435.5 | $229.4 | $2,347.4 |
| First Nations | $186.4 | $433.4 | $360.1 | $157.3 | $1,137.2 |
| Recreational | | $231.0 | $98.4 | $72.0 | $401.4 |
| Conservation | $84.5 | $47.2 | $16.0 | | $147.7 |
| Multi-Sectoral | | | $82.0 | | $82.0 |
| Total | $701.2 | $1,963.8 | $992.0 | $458.7 | $4,115.7 |

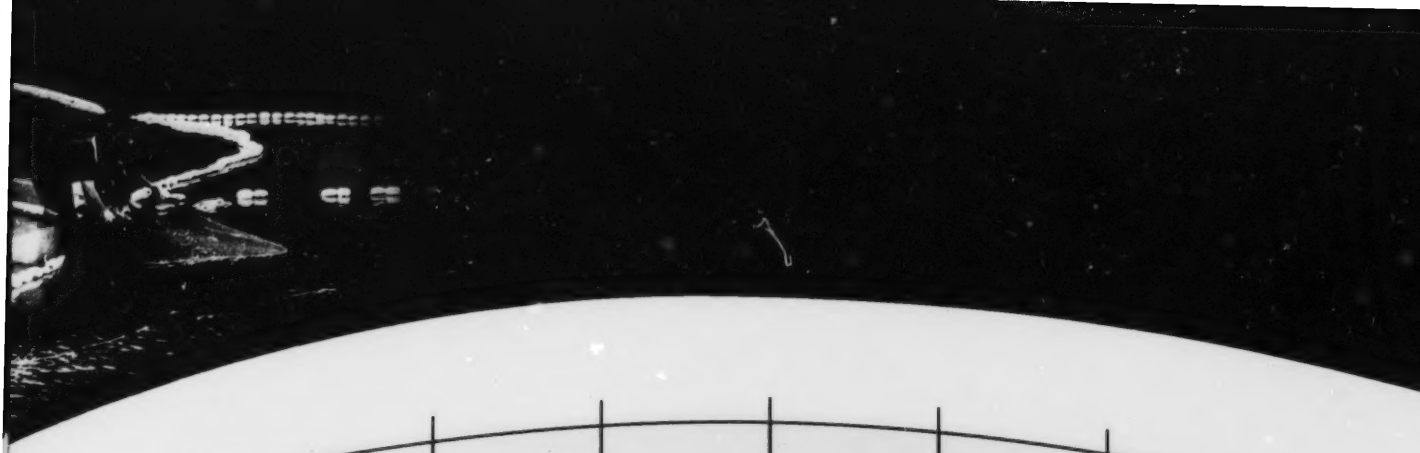
**Table 6:** Pilot Project Costs by Sector ($,000s)

in 1998; 39 in 1999; 46 in 2000; and 22 in 2001. In descending order of number of projects by sector, the ranking was: 73 commercial sector projects; 24 First Nations projects; 19 recreational sector projects; four conservation sector and two multi-sector projects.

The total cost expended to date for pilot projects across all sectors, gear types and methods of selective fishing totals $4.25 million. Table 6 provides a breakdown of pilot project costs by sector for the four-year program.

Within the commercial sector, the following types of pilot projects were completed:

- Fifteen projects tested gillnet selectivity. One third of these tests involved comparing the use of Alaska twist web against either a standard control web, or tooth tangle web, to determine rates of capture and survivability of target versus non-target species of salmon. The rest of the gillnet studies examined such things as varying mesh size in multi-panel nets, different weed-line configurations, and the selectivity and survivability of tooth tangle web nets. One study evaluated the use of a Baltic Sea net. A specific tangle net study, and weed-line study were also carried out, sponsored by the gillnet sector.
- Fifteen studies tested various trap net configurations, including: stationary and mobile floating traps; in-river versus approach water locations; trap nets configured with power assisted fish wheels; and paddle trap nets.
- Six projects focused on training and education, and included production of videos (1 project) and development and implementation of workshops (5 projects).
- Five projects examined the use of seine grids in seine nets, including various materials from which the grids could be fabricated, locations of grids, and grid opening shapes and sizes. At least two of the pilot projects evaluated seine net bunt design.
- Revival tank studies were the key focus of five projects.
- Three time-and area-studies investigated whether it is possible to reduce encounters with non-target species while still encountering enough targeted fish to permit a fishery.
- Three mortality studies examined the effects of releasing coho salmon from seine, gillnet and trolling gear.
- Two brailer studies tested effectiveness of a new sock-style brailer that allows fish to be gently lifted from the water to the deck of the vessel.
- Two coho mapping studies added new knowledge about coho migration timing and distribution in the approach waters of the Skeena River.



| Selective Fishing Gear | 1998 | 1999 | 2000 | 2001 | Total |
|---|---|---|---|---|---|
| Seine | | $150.4 | $9.4 | $39.4 | $199.2 |
| Gillnet | $39.5 | $754.5 | $75.3 | $75.9 | $945.2 |
| Troll | $15.3 | $167.0 | $77.5 | | $259.8 |
| Commercial Gear | | | | $10.0 | $10.0 |
| Revival Tanks | | | $50.8 | $39.6 | $90.4 |
| Trap | $591.2 | $480.2 | $211.6 | | $1,283.0 |
| Fish Wheel | | $180.7 | $222.0 | | $402.7 |
| Beach Seine | $55.2 | | | | $55.2 |
| Recreational | | $231.0 | $62.6 | $45.0 | $338.6 |
| Training & Educational | | | $282.8 | $248.8 | $531.6 |
| Total | $701.2 | $1,963.8 | $992.0 | $458.7 | $4,115.7 |

**Table 7: Pilot Project Costs by Selective Fishing Gear ($.000s)**

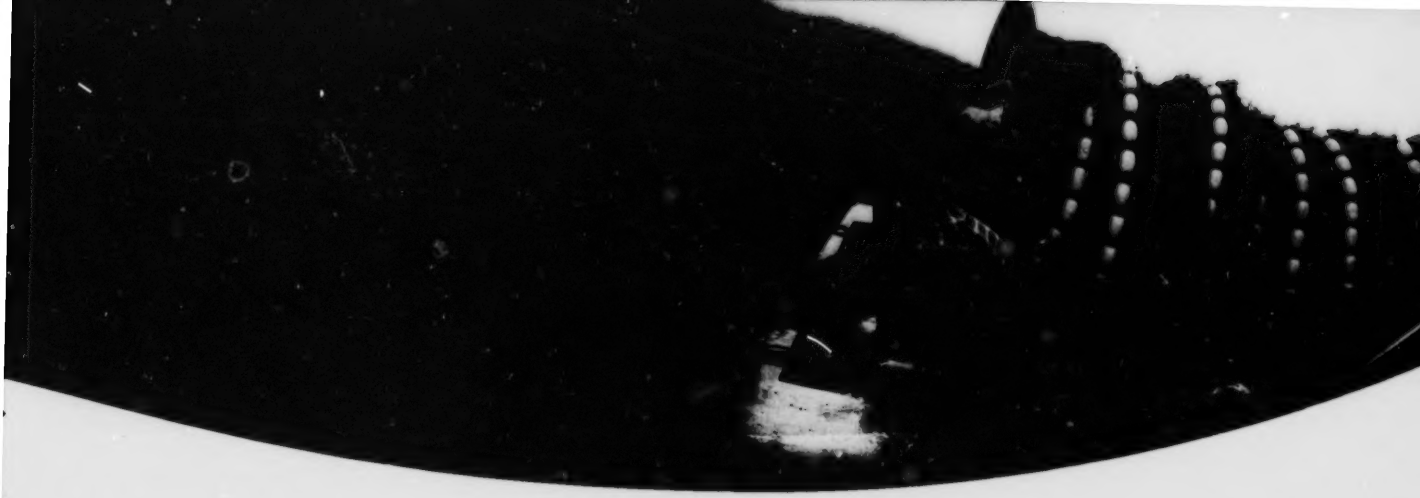
- One beach seine study in the Fraser River tested the effectiveness of live sorting and the recovery success of coho by-catch.
- One hook study tested hook corrosion, barbed versus barbless hooks, hook covers, and in-water revival.
- One fish-wheel study examined various designs for fishing the slow waters of the lower Fraser River.
- One study of an on-board monitoring system.
- There were four trap projects initiated within the commercial sector, three conducted in the lower Fraser River, and one, involving a drift trap net supported by two gillnet vessels, carried out in northern waters (Areas 3, 4 and 5).

Within the First Nations sector, the following pilot projects were completed:

- Eleven trap net projects, in which both free floating and stationary in-river designs were tested.
- Six projects involving fish wheels in locations such as the lower Fraser River, Skeena River and Babine River.
- Five training and education projects, most of which involved training members of First Nations on selective salmon fisheries and their management. Workshops and education materials, such as videos, were also key elements of these projects.
- One revival tank study.
- One project that examined an in-water sorting system aimed at achieving zero mortality of non-target species, and an on-board stun-bleed-transport system for target species.

Within the recreational sector, pilot projects completed over the four-year program included:

- Five training and education projects aimed at teaching recreational anglers about selective fishing practices. The "FishSmart" children's (grades 4 to 6) Responsible Fishing Program was developed as one of these projects.



- Five catch monitoring/hooking mortality studies.
- Three studies that involved testing the selectivity of various hooks and lures on target and non-target salmon species.
- Two studies that focused on coho conservation objectives in the red zone, and coho encounters during experimental sockeye/chinook sport fisheries, respectively.
- One project that involved the construction of eight kiosks as part of a recreational catch monitoring project.

Four projects were completed under the category of "Other" which includes academic, communications and community groups. Two of these projects involved selective fishing workshops, and two were associated with developing and marketing FishSmart, an educational program for school-aged youth in which they learn about responsible fishing.

There were two projects identified under the category of "Workshops", one involving a report and presentation on fisheries sustainability, and the other a workshop for commercial harvesters on the rationale and methods for selective and responsible fishing.

Table 7 presents a cost breakdown by gear type of the 122 pilot projects completed over the four-year program.

Table 8 provides a breakdown of pilot projects by selective fishing method, including commercial gear modifications; new and alternative selective fishing gear; and biological studies such as encounters and mortality studies.

Additional details regarding the results of the pilot projects can be found on the department's selective fishing website.

## Partners

The overall benefits of the Selective Fisheries Program for harvesters were tremendously extended through the participation of a number of key organizations and individuals working in partnership. Key partners included: government agencies, multi-sectoral groups, First Nations, commercial harvesters and processors, recreational anglers, academic institutions, private sector technical specialists and media/communications specialists, non-governmental organizations, community associations, and interested individuals.

## Federal Partners

Fisheries and Oceans Canada was the key federal government partner in the program. Through the Selective Fisheries Program, the department worked closely with its federal partners: Western Economic Development, Department of Indian and Northern Development (DIAND) and Human Resource Development Canada. Fisheries and Oceans Canada developed the primary policies for the program, provided funding, and was responsible for ensuring that the six key program elements (identified earlier in this report) were implemented effectively. DIAND deserves recognition for providing a coordinator for First Nations selective fisheries development. The position worked through the BC Aboriginal Fisheries Commission to support individual First Nations with gear development and training programs.

Additional federal government support for the program was provided by Environment Canada, which had input to policy development; and by Industry Canada, which co-funded the program through its Industrial Research Assistance Program (IRAP).

| Selective Fishing Method | 1998 | 1999 | 2000 | 2001 | Total |
|---|---|---|---|---|---|
| Brailer | | 1 | 1 | | 2 |
| Grids | | 3 | 1 | 1 | 5 |
| Seine Gear | | | 1 | 3 | 4 |
| Alaska Twist | | | | 5 | 5 |
| Baltic Sea Net | | 1 | | | 1 |
| Mesh Size | 1 | 2 | | 2 | 5 |
| Tooth/tangle Net | 1 | 1 | 1 | 1 | 4 |
| Weedline | | 1 | 1 | | 2 |
| Gillnet Gear | | 1 | 2 | | 3 |
| Troll Gear | 1 | | 3 | | 4 |
| Hooking Mortality | | 1 | | | 1 |
| Hooks and Lures | | 2 | | 1 | 3 |
| Recreational Gear and Methods | | 1 | | | 1 |
| Beach Seine | 1 | | | | 1 |
| Fish Wheel | | 2 | 5 | | 7 |
| Trap | 11 | 9 | 9 | 1 | 30 |
| Revival Tanks | | 2 | 3 | 1 | 6 |
| Catch Monitoring | | | 1 | | 1 |
| Encounters | | 3 | 1 | | 4 |
| Mapping | | 2 | | | 2 |
| Marine Mammal Mortality | | | | 1 | 1 |
| Mortality | | 7 | | | 7 |
| Training & Education | | | 17 | 6 | 23 |

**Table 8:** Pilot Projects by Method of Study

## Other Key Partners

Area B Selective Fishery Joint Venture Society of BC

BC Aboriginal Fisheries Commission (BCAFC) and member organizations

BC Conservation Foundation

BC Ministry of Agriculture, Food and Fisheries

British Columbia Institute of Technology

Ecotrust

First Nations councils and organizations

Fishing Industry Selective Salmon Harvesters Association (FISSH)

Fraser Valley Salmon Society Fisheries Renewal BC

Individual First Nations throughout the province

Regional Aquatic Management Society

Selective Fisheries Multi-stakeholder Steering Committee

Selective Fishing Committee of Prince Rupert

Sierra Club

Simon Fraser University

Sport Fishing Advisory Board

## Other Contributors

In addition to the direct financial, material, and in-kind contributions provided by the organizations named above, there are many others who have made significant contributions. Many of the proponents of selective fishing gave significant amounts of their time, and used their own equipment, materials and resources to further selective fisheries.

## PartThree

In this concluding part, key success factors are summarized and responsibilities for continued development of selective salmon fisheries are described.

### Key Success Factors

A number of factors contributed to the overall effective delivery of the Selective (Salmon) Fisheries Program.

### Strong Leadership

In 1998, the Minister indicated that selective fishing objectives would guide the development of harvesting management plans for 1998 and beyond, and that their adoption would have profound implications for the way salmon fisheries are conducted. The clear policy statements made by the Minister left no doubt that the future of fisheries on the Pacific coast was inextricably linked to selective fishing.

### Explicit Policy

Fisheries and Oceans Canada's *New Directions* series of policy papers made a significant contribution to demonstrating this determination and winning acceptance of selective fishing as a "permanent change" to Pacific fisheries. As part of the series, the department developed a policy explicitly for selective fishing entitled *A Policy for Selective Fishing in Canada's Pacific Fisheries*. The continuing series of *New Directions* policy papers has maintained the momentum and supported the department's efforts to re-direct the management of the Pacific salmon fishery.

### Realistic Goals and Expectations

The goal of the Selective (Salmon) Fisheries Program was clearly conservation-based, and embraced in light of the serious declines in weaker salmon stocks over the past decade.

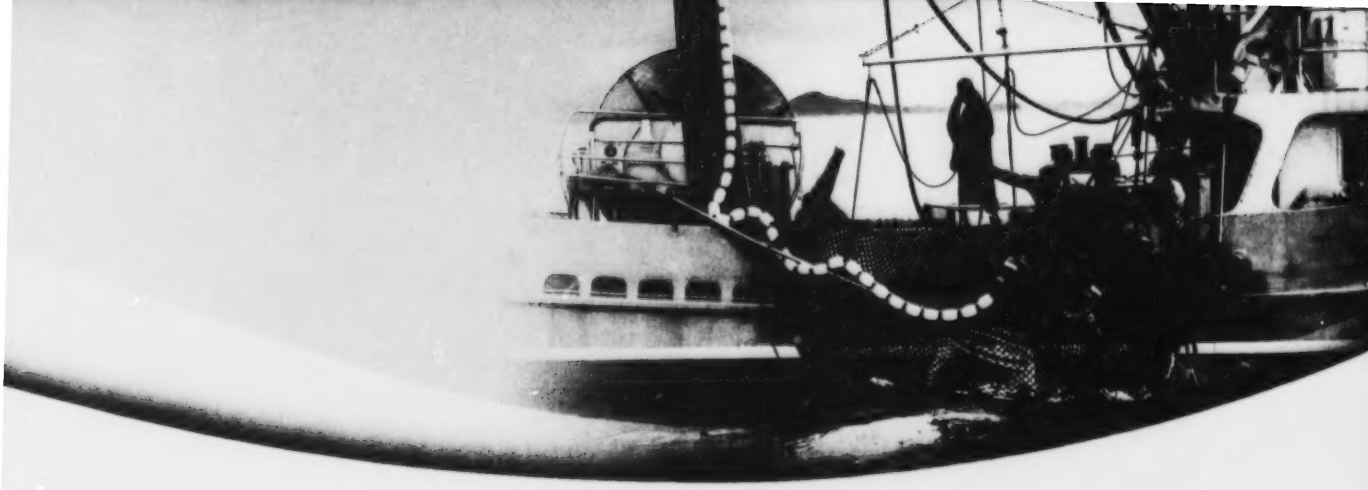
The commercial sector was already accepting of the need for sustainability and resource conservation, and had developed the *Canadian Code for Responsible Fishing*. International experience with threats to fisheries, and responses to those threats, helped to ease the introduction of selective fishing and garner support early in the program.

Expectations among First Nations were linked, at least in part, to their aspirations to demonstrate that reintroduction of traditional fisheries and fishing methods could be used to prosecute their communal fisheries, while meeting Fisheries and Oceans Canada's conservation objectives.

Expectations within the recreational sector centered on the desire to maintain sport fishing opportunities and was challenged by the large and diverse angling population, many of whom are from places other than BC.

### Realistic Time Frame

The Selective Fisheries Program was initially a three year program, that was extended an additional year. The initial term of the program was realistic, based on run expectations at that time. Extending it by an additional year was done in recognition of low returns during two years of the program, which made assessment of the effectiveness of some selective fishing methods difficult.



## Dedicated Funding

Secure funding for the Selective Fisheries Program was provided as part of a Canada-wide adjustment and restructuring program involving four federal partners. Additional funding for pilot projects was provided by casting in policy that up to 5% of the coast-wide TAC could be used to pay for selective fishing pilot projects.

## Inclusive Approach and Effective Partnering

Although Fisheries and Oceans Canada was the primary sponsor of the Selective Fisheries Program, a number of harvesting sector organizations, environmental non-government organizations, academic institutions, and government agencies joined with Fisheries and Oceans Canada to provide funding, participate in pilot projects, and develop communications and training tools. In a number of cases, harvesters joined together to form selective fishing committees whose aim was to further the objectives of the program.

In addition to being supported by these organized interests, the Selective Fisheries Program captured the attention, and harnessed the leadership and energy, of key individuals in each sector of the fishery who are highly respected by their peers. By embracing the policy and championing the program, these individuals provided a draw for others, some of whom were not necessarily convinced of the need for, or potential benefits of, the program.

First Nations, commercial harvesters and recreational anglers were involved every step of the way, from design and execution of selective fishing pilot projects, to participation in research projects, to delivery of training programs, and participation in multi-stakeholder work-shops. Involvement of licence holders contributed significantly to the enthusiasm for and commitment to selective fishing changes. Participants in the February 1999 multi-stakeholder workshop, for example, reviewed a proposal for selective fishing training, discussed and debated priorities for selective fishing pilot projects and research, identified pilot project selection criteria, and considered training and education needs.

## Effective Use of Scientific Method

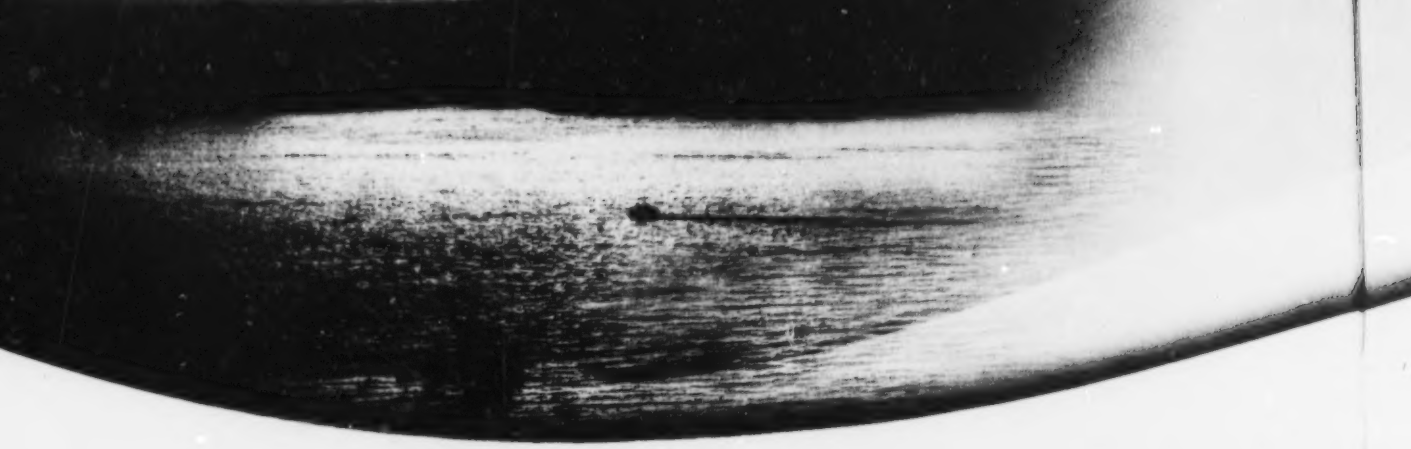
Use of the scientific method to test selective fishing gear and fishing methods contributed to harvester's acceptance of change.

Under the Selective Fisheries Program, a new working relationship was established between licence holders and Fisheries and Oceans Canada scientists.

The new relationship between harvesters and scientists, and the sound scientific basis of selective fishing experiments, made the results of the pilot projects and research studies more compelling.

## Effective Communications

Throughout the Selective Fisheries Program, multi-stakeholder workshops were held at least annually. These were complemented by smaller meetings of gear and sectoral groups. Fisheries and Oceans Canada distributed information on selective fishing and the Selective Fisheries Program through its web site and published documents. Fisheries and Oceans Canada sponsored or produced a number of videos on selective fishing.



## The Road Ahead

It is clear from policy statements made by the Minister of Fisheries and Oceans at the outset of the Selective Fisheries Program, that there can be no return to pre-1998 non-selective fisheries.

The region's selective fishing policy outlines the expectations and responsibilities of harvesters to continue to implement and develop new selective techniques and practices. An emphasis has also been placed on the need for continued learning, training and education.

It may be necessary for harvesters to carry out additional pilot projects in future. This is especially the case where new and potentially promising selective fishing initiatives may be proposed that are not ready to be implemented without testing.

Fisheries and Oceans Canada will continue to work with harvesters to implement new gear and fishing practices into the annual fishing plans.

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